

$$1) 16(8)^{2x} = 32^{5x}$$

$$2^4(2^3)^{2x} = (2^5)^{5x}$$

$$2^4(2^{6x}) = 2^{25x}$$

$$4 + 6x = 25x$$

$$4 = 19x$$

$$\boxed{\frac{4}{19} = x}$$

$$2) 9^2(3)^{-3x} = 81^{4x}$$

$$(3^2)^2(3)^{-3x} = (3^4)^{4x}$$

$$3^4 \cdot 3^{-3x} = 3^{16x}$$

$$4 - 3x = 16x$$

$$4 = 19x$$

$$\boxed{\frac{4}{19} = x}$$

$$3) 8^x(16)^{2x} = 32^{3/5}$$

$$(2^3)^x(2^4)^{2x} = (2^5)^{3/5}$$

$$2^{3x} \cdot 2^{8x} = 2^3$$

$$3x + 8x = 3$$

$$11x = 3$$

$$\boxed{x = \frac{3}{11}}$$

$$4) 125,000(0.938)^6$$

$$\boxed{85,139}$$

After 4 months, there will be fewer than 100,000 fish.

$$5) 102\left(\frac{1}{2}\right)^{d/15}$$

or

$$102(0.955)^d$$

$$\left(\frac{1}{2}\right)^{1/15} = 0.955$$

$$102\left(\frac{1}{2}\right)^{21/15}$$

$$\boxed{38.65\text{mg}}$$

or

$$102(0.955)^{21}$$

$$\boxed{38.7\text{mg}}$$

$$1) (\sqrt{x-5})^2 = 8^2$$

$$x-5 = 64$$

$$\boxed{x = 69}$$

$$2) (\sqrt{3x+8})^2 = (\sqrt{x+6})^2$$

$$3x+8 = x+6$$

$$2x = -2$$

$$\boxed{x = -1}$$

$$3) ((2x-6)^{\frac{2}{3}})^{\frac{3}{2}} = 16^{\frac{3}{2}}$$

$$2x-6 = 64$$

$$\boxed{x = 35}$$

$$4) ((6x+2)^{\frac{3}{5}})^{\frac{5}{3}} = 8^{\frac{5}{3}}$$

$$6x+2 = 32$$

$$\boxed{x = 5}$$

$$5) 2(8)^{3x} = 16^{5x}$$

$$2^1(2^3)^{3x} = (2^4)^{5x}$$

$$2^1(2^{9x}) = 2^{20x}$$

$$1+9x = 20x$$

$$1 = 11x$$

$$\boxed{\frac{1}{11} = x}$$

$$6) 125(25)^{-3x} = 25^{4x}$$

$$5^3(5^2)^{-3x} = (5^2)^{4x}$$

$$5^3(5^{-6x}) = 5^{8x}$$

$$3-6x = 8x$$

$$3 = 14x$$

$$\boxed{\frac{3}{14} = x}$$

$$7) \left(\frac{216x^3y^{-4}}{x^6y^2} \right)^{\frac{2}{3}}$$

$$\left(\frac{216}{x^3y^6} \right)^{\frac{2}{3}}$$

$$\left(\sqrt[3]{\frac{216}{x^3y^6}} \right)^2$$

$$\left(\frac{6}{xy^2} \right)^2 \rightarrow \boxed{\frac{36}{x^2y^4}}$$

$$8) \left(\frac{5x^5y^6}{12xy^{-2}} \right)^{-2}$$

$$\left(\frac{5x^4y^8}{12} \right)^{-2}$$

$$\left(\frac{12}{5x^4y^8} \right)^2$$

$$\boxed{\frac{144}{25x^8y^{16}}}$$